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|    | U | I | Document ID   | Issue Date | Pages | Title                                                   | Current OR     | Current XRef                     | Re... |
|----|---|---|---------------|------------|-------|---------------------------------------------------------|----------------|----------------------------------|-------|
| 16 | P | I | US 6185639 B1 | 20010206   |       | System and method to reduce a computer system's         | 710/48         | 710/263;<br>710/5                |       |
| 17 | P | I | US 6151595 A  | 20001121   |       | Methods for interactive visualization of spreading      | <u>707/1</u>   | <u>345/589;</u><br><u>707/2;</u> |       |
| 18 | P | I | US 6111255 A  | 20000829   |       | Methods of screening for a tumor or tumor progression   | 250/339.12     | 250/339.08                       |       |
| 19 | P | I | US 6049793 A  | 20000411   |       | System for building an artificial neural network        | 706/17         | 706/20                           |       |
| 20 | P | I | US 5945675 A  | 19990831   |       | Methods of screening for a tumor or tumor progression   | 250/339.12     | 250/339.08                       |       |
| 21 | P | I | US 5574837 A  | 19961112   |       | Method of generating a browser interface for            | 345/440        |                                  |       |
| 22 | P | I | US 5339390 A  | 19940816   | 21    | Operating a processor to display stretched              | <u>345/782</u> | <u>345/848</u>                   |       |
| 23 | P | I | US 4959802 A  | 19900925   |       | Video bus for a vision system                           | 701/1          | 901/46                           |       |
| 24 | P | I | US 4706120 A  | 19871110   |       | Modular, vision system for automation of inspection and | 348/114        | 180/168;<br>180/169;             |       |
| 25 | P | I | US PP04025 P  | 19770322   |       | Rose plant                                              | PLT/121        |                                  |       |

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	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R44
11	P	F	US 6252597 B1	20010626		Scalable user interface for graphically representing	345/841	345/854	
12	P	F	US 6226408 B1	20010501		Unsupervised identification of nonlinear data cluster in	382/224	382/156; 382/197;	
13	P	F	US 6219727 B1	20010417		Apparatus and method for computer host system and	710/48	709/321; 710/1;	
14	P	F	US 6216228 B1	20010410		Controlling video or image presentation according to	713/176	380/206; 380/239;	
15	P	F	US 6214550 B1	20010410	53	Methods of differentiating metastatic and	435/6	435/4; 436/501	
16	P	F	US 6185639 B1	20010206		System and method to reduce a computer system's	710/48	710/263; 710/5	
17	P	F	US 6151595 A	20001121		Methods for interactive visualization of spreading	707/1	345/589; 707/2;	
18	P	F	US 6111255 A	20000829		Methods of screening for a tumor or tumor progression	250/339.12	250/339.08	
19	P	F	US 6049793 A	20000411		System for building an artificial neural network	706/17	706/20	
20	P	F	US 5945675 A	19990831		Methods of screening for a tumor or tumor progression	250/339.12	250/339.08	
21	P	F	US 5574837 A	19961112		Method of generating a	345/440		

US:

Delimiters for:

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display$4 and cluster$5 near 10
highlight$3 and nodes$5 or tree$1 or
leaves
  
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 BRS form	 Caption	 Image	 Text	 Field
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- ☒ L176: (3) (space or surface) adj2 map\$5 and high adj2
- ☒ L43: (18) 8 and centroids
- ☒ L183: (18) 8 and centroids and vector
- ☒ L190: (329) surface adj3 (map\$5 or detail) and vector
- ☒ L197: (35) surface adj3 (map\$5 or detail) and vector
- ☒ L218: (2) surface adj3 (map\$5 or detail) and vector
- ☒ L211: (4) surface adj3 (map\$5 or detail) and vector
- ☒ L204: (8) surface adj3 (map\$5 or detail) and vector

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DBs: USPAT:US:RGPUB:EPD:JPO:DEF ☒ PluralsDefault operator: OR ☒ Highlight all hit terms initially

surface adj3 (map\$5 or detail) and
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and centroid\$

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5836872 A	19981117	19	Digital optical visualization, enhancement,	600/306	382/128	
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5592599 A	19970107	62	Video special effects system with graphical operator	345/427	345/649; 345/722	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5519618 A	19960521	76	Airport surface safety logic	701/120	701/301	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5374932 A	19941220	78	Airport surface surveillance system	342/36	342/29; 342/39;	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5067085 A	19911119		Optical robotic canopy polishing system	700/164	451/5; 451/6;	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5016173 A	19910514	16	Apparatus and method for monitoring visually	382/128	382/165; 382/190;	

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Q0: USPAT: US-PGPUB: EPO: JPO: DEF ☒ Plural

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557 and 559

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	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
1	<input type="checkbox"/>	<input type="checkbox"/>	US 6327574 B1	20011204	39	Hierarchical models of consumer attributes for	705/14	705/10; 705/26	
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 6289353 B1	20010911	41	Intelligent query system for automatically indexing in a	707/102	707/101; 707/3	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6269368 B1	20010731	20	Information retrieval using dynamic evidence combination	707/6	707/3; 707/4;	
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5974412 A	19991026	43	Intelligent query system for automatically indexing	707/3	707/10; 707/102	
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5794178 A	19980811	45	Visualization of information using graphical	704/9	345/440; 345/839;	



☒ L260: (0) 253 and 1
☒ L267: (1) 253 and 57
☒ L274: (7) 1 and genetic and cluster\$4
☒ L281: (8) 1 and (gene or dna or protein or genetic) a
☒ L288: (0) 1 and (gene or dna or protein or genetic) a
☒ L295: (4) 1 and (gene or dna or protein or genetic) a
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Default operator: OR ☒ Highlight all hit terms initially

1 and (gene or dna or protein or genetic) and cluster\$4

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U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6301579 H1	20011009	46	Method, system, and computer program product for	707/102	345/440; 707/104.1	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6289353 B1	20010911	41	Intelligent query system for automatically indexing in a	707/102	707/101; 707/3	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6289337 B1	20010911	14	Method and system for accessing information using	707/3	707/10; 707/103R;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6269325 B1	20010731	13	Visual presentation technique for data mining	703/2	345/440; 703/22;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5974412 A	19991026	43	Intelligent query system for automatically indexing	707/3	707/10; 707/102	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5884282 A	19990316	31	Automated collaborative filtering system	705/27	705/12; 705/26;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5835085 A	19981110	13	Graphical display of relationships	345/853	345/440	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5596703 A	19970121	14	Graphical display of relationships	345/700	345/440	



- L323: (7) 57 and (gene or dna or protein or genetic)
- L337: (84) cluster and 1
- L344: (33) cluster and 64
- L351: (426) cluster and 50
- L358: (706) cluster and 57
- L365: (1146) cluster and 382/\$.cccls.
- L372: (3) cluster and 382/\$.cccls. and 351 and 353
- L379: (80) 702/20 and genetic
- L386: (16) 1 and genetic
- L393: (0) 1 and genetic and 379
- L400: (8) 1 and genetic and 345/\$.cccls.

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DBs: USPAT; US-PGPUB; EPO; JPO; DEF ☒ Plurals

Default operator: OR

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1 and genetic and 345/\$.cccls.

	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 6304262 B1	20011016	16	Information security analysis system	345/418		
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		US 6269325 B1	20010731	13	Visual presentation technique for data mining	703/2	345/440; 703/22;	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		US 6074831 A	20000613	15	Partitioning of polymorphic DNAs	435/6	345/440; 435/91.1;	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		US 5835085 A	19981110	13	Graphical display of relationships	345/853	345/440	
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		US 5596703 A	19970121	14	Graphical display of relationships	345/700	345/440	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5586052 A	19961217	16	Rule based apparatus and method for evaluating an	703/1	345/440; 700/182;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5511158 A	19960423	13	System and method for creating and evolving	345/440	345/419; 345/420;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5510995 A	19960423	26	Sculptured surface synthesis based on functional design	700/182	345/419; 345/440	

EAST - [9408716.wsp:1]

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☒ L50: (28) 8 and clusters
☒ L57: (16) 43 and 50
☒ L64: (8) 43 and 50 and surface
☒ L71: (15) 43 and 50 and detail\$3
☒ L78: (8) 43 and 50 and map\$5
☒ L85: (8) 64 and 71
☒ L92: (5) 64 and 78

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 64 and 78

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5794178 (A)	19980811	45	Visualization of information using graphical	704/9	345/440; 345/839;	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5675819 A	19971007	29	Document information retrieval using global word	704/10	704/9; 707/3;	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5619709 A	19970408	45	System and method of context vector generation and	707/532	704/9; 707/2	



L239: (80) 702/20 and genetic
 L246: (15) 232 and 239
 L253: (133) 232 or 239
 L260: (0) 253 and 1
 L267: (1) 253 and 57
 L274: (7) 1 and genetic and cluster\$4
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	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 6289353 B1	20010911	41	Intelligent query system for automatically indexing in a	707/102	707/101; 707/3	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 6289337 B1	20010911	14	Method and system for accessing information using	707/3	707/10; 707/103R;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 6269325 B1	20010731	13	Visual presentation technique for data mining	703/2	345/440; 703/22;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5974412 A	19991026	43	Intelligent query system for automatically indexing	707/3	707/10; 707/102	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5884282 A	19990316	31	Automated collaborative filtering system	705/27	705/12; 705/26;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5835085 A	19981110	13	Graphical display of relationships	345/853	345/440	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		US 5596703 A	19970121	14	Graphical display of relationships	345/700	345/440	

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-# L260: (0) 253 and 1
-# L267: (1) 253 and 57
-# L274: (7) 1 and genetic and cluster$4
-# L281: (8) 1 and (gene or dna or protein or genetic) a
-# L288: (0) 1 and (gene or dna or protein or genetic) a
-# L295: (4) 1 and (gene or dna or protein or genetic) a
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-# (0) 1 and cluster$3 and algorithm and user and (in

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1 and (gene or dna or protein or genetic) and cluster\$4 and tree\$

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U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6301579 B1	20011009	46	Method, system, and computer program product for	707/102	345/440; 707/104.1	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6289353 B1	20010911	41	Intelligent query system for automatically indexing in a	707/102	707/101; 707/3	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6269325 B1	20010731	13	Visual presentation technique for data mining	703/2	345/440; 703/22;	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5974412 A	19991026	43	Intelligent query system for automatically indexing	707/3	707/10; 707/102	



FIG. 2 shows a dendrogram produced by Neighbor Joining (NJ) analysis of binary files representing the presence and absence of 1,251 amplification products from each strain produced with six different primer combinations and the method of the present invention (tree length=960, consistency index=0.74, retention index=0.83 with 168 characters). The tree is rooted with the K-12 derivative MC 1061 as an outgroup. Among the O157:H7 strains, 1,060 of the 1,252 characters were conserved. Human isolates (H) and cattle isolates (C) have been previously described (Shere et al., Appl. Environ. Microbiol. 64:1390-1399, 1998; Gouveia et al., J. Clin. Microbiol. 36:727-733, 1998).

FIG. 3 shows a dendrogram produced by Neighbor Joining (NJ) analysis of binary files representing the presence and absence of 1,250 amplification products from each strain produced with six different primer combinations and the method of the present invention (tree length=1398, consistency index=0.61, retention index=0.81 with 235 characters). Among the O157:H7 strains, 892 of the 1,250 bands were conserved. The tree is rooted using the K-12 derivative MC 1061 as an outgroup. The state from which each strain originated is indicated by the two letter abbreviation in parentheses. Human isolates have an H at the end of the designation and bovine isolates are in bold.

DETAILED DESCRIPTION:

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

All publications, patents, patent applications or other references cited in this application are herein incorporated by reference in their entirety as if each individual publication, patent, patent application or reference were specifically and individually indicated to be incorporated by reference.

As used herein, the term "oligonucleotide" means a molecule consisting of at least two deoxyribonucleotides or ribonucleotides joined by phosphodiester bonds.

As used herein the term "primer" or "oligonucleotide primer" means an oligonucleotide, either naturally occurring as in a purified restriction enzyme digest or produced synthetically, that under the proper conditions, is capable



S 6,284,466 B1
Sep. 4, 2001

NOTES

1. (GCA) 1987-1991.

Genetic Linkage Map of
Length, Polymorphism,
1, p. 312.

Sequence of Escherichia
Genetic Linkage Map.

Method: A New Method
Genetic Linkage Map.

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 Sep. 4, 200

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Genetic Linkage Map for
Length Polymorphisms
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Genetics of Endometriosis
 Journal of Endocrinology
 Method & New Address
 from, Vol. 82, 1977.
 as compiled by primary
 authors, Kinship Analysis
 1975.
 Role of Chromosomes in
 Genetic Disorders
 1977.
 (see page.)
 English
 American Women, Living

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is amplified by the poly-
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down and differences
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lead to the identification
of each on surveys of an-
tigenic variation. In
determination of poly-
merase frequency. The
enzyme has multipro-
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multiproduct, multi-

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Determination of Genetic Relationships

Organisms from within a limited geographic region. Studies on a characterized strain set derived from dairy cattle and humans within a three-county region of Wisconsin were conducted. Human isolates in this set were derived from sporadic cases (FRIK 523 through FRIK 579) and an outbreak of hemorrhagic colitis at a daycare center (FRIK 583 through FRIK 856) that occurred during 1994 (Gouveia et al., J. Clin. Microbiol. 36:727-733, 1998). Cattle isolates (FRIK 920 through FRIK 1641) were derived from a 1995-1996 longitudinal study of three dairy cattle farms in this same region (Shere et al., Appl. Environ. Microbiol. 64:1390-1399, 1998).

Analysis using the method of the present invention was performed on each isolate using the six different primer combinations described above. Binary files were created in Microsoft Excel 97.RTM. from printed copies of the images produced by an Alden 9315CTP photographic quality thermal printer (Alden Electronics, Inc., Westborough, Mass.). The files were generated from the presence/absence of bands (FIG. 1) between 200-1500 bases in length and binary files from each primer pair were combined head to tail in Microsoft Word 97.RTM.. Phylogenetic relationships based on the amplification products were assessed through maximum parsimony methods in PAUP V.4.0 (Swofford, PAUP version 4, Sinauer Associates, Sunderland, Mass.) and by Neighbor Joining (NJ) analysis (Saitou et al., Mol. Biol. Evol. 4:406-425, 1987), both of which yielded similar results. The E. coli K-12 strain MC1061, which is phylogenetically distant from E. coli O157:H7 was included in each analysis as an outgroup to assess the ancestral state of the characters as described (Boerlin et al., Infect. Immun. 66:2553-2561, 1998). The O157:H7 strain ATCC43895 (EDL933) was included as a standard O157:H7 strain.

Of 1,251 amplification products scored from this strain set, 191 segments were variable among the O157:H7 strains, indicating that within this limited geographic region, a considerable amount of genomic diversity can be observed by the method of the present invention. Of these variable segments, 140 were parsimony-informative.

A dendrogram obtained by NJ analysis (FIG. 2) demonstrated that the strains

6,284,466 B1
Sep. 4, 2001

NOTES

US 6,284,466 B1

Genetic Linkage Map to

Length Polymorphisms

in E. coli

Sequence of Enterohemorrhagic

Escherichia coli

Method: A New Method

Proc. Natl. Acad. Sci.

was completed by primary

sequence, Number: 100

Whole Genomes: Pairwise

Distance: 0.001

not page 3

which

Images: From: Left

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Two of polymorphisms in

whole genomes: DNA

is analyzed by the poly-

based on strand length

polymorphisms and differences

in the amplification products

from the strains

with or without sequence

in present invention. In

determination of poly-

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☒ L15: (0) high adj2 dimensional adj2 vector and surfac
☒ L22: (16) high adj2 dimensional adj2 vector and detai
☒ L29: (0) 8 and 34/\$.ccls.
☒ L36: (1) 8 and 345/\$.ccls.
☒ L43: (18) 8 and centroids
☒ L50: (28) 8 and clusters
☒ L57: (16) 43 and 50

Failed

Search
 DBs: USPAT:US:PGPUB:EPO:JPO:DEF ☒ Plurals
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 43 and 50

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Re
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6134532 A	20001017	41	System and method for optimal adaptive matching of	705/14	705/1; 705/26	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6122628 A	20000919	34	Multidimensional data clustering and dimension	707/5	707/2; 707/3	
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5794178 A	19980811	45	Visualization of information using graphical	704/9	345/440; 345/839;	
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5789726 A	19980804	16	Method and apparatus for enhanced transaction card	235/380	382/220	
12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5675819 A	19971007	29	Document information retrieval using global word	704/10	704/9; 707/3;	
13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5619709 A	19970408	45	System and method of context vector generation and	707/532	704/9; 707/2	
14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5325298 A	19940628	23	Methods for generating or revising context vectors for	704/9	707/5	
15	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5317507 A	19940531	21	Method for document retrieval and for word sense	707/532		
16	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6298174 B	20011002	10	Document content and context determination and display			

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☒ L15: (0) high adj2 dimensional adj2 vector and surfac
☒ L22: (16) high adj2 dimensional adj2 vector and detai
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☒ L43: (18) 8 and centroids
☒ L50: (28) 8 and clusters
☒ L57: (16) 43 and 50

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	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Re
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6298174 B1	20011002	10	Three-dimensional display of document set	382/305	358/403; 707/1	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6208752 B1	20010327	25	System for eliminating or reducing exemplar effects in	382/155	382/191	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6189002 B1	20010213	16	Process and system for retrieval of documents using	707/1	706/15; 707/5	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6173275 B1	20010109	30	Representation and retrieval of images using context	706/14	382/190; 382/195;	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6134541 A	20001017	30	Searching multidimensional indexes using associated	707/2	707/1; 707/3	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6134532 A	20001017	41	System and method for optimal adaptive matching of	705/14	705/1; 705/26	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6122628 A	20000919	34	Multidimensional data clustering and dimension	707/5	707/2; 707/3	
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5794178 A	19980811	45	Visualization of information using graphical	704/9	345/440; 345/839;	
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5789726 A	19980804	16	Method and apparatus for	235/380	382/220	

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1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6157621 A	20001205	143	Satellite communication system	370/310	370/394; 370/400;	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5592599 A	19970107	62	Video special effects system with graphical operator	345/427	345/649; 345/722	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5519618 A	19960521	76	Airport surface safety logic	701/120	701/301	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5374932 A	19941220	78	Airport surface surveillance system	342/36	342/29; 342/39;	

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1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6172679 B1	20010109	39	Visibility calculations for 3D computer graphics	345/421	345/422	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6157621 A	20001205	143	Satellite communication system	370/310	370/394; 370/400;	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5914721 A	19990622	38	Visibility calculations for 3D computer graphics	345/421	345/422	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5742295 A	19980421	57	Video special effects system with graphical operator	345/427	345/650	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5710700 A	19980120	19	Optimizing functional operation in manufacturing	700/29	700/108	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5691895 A	19971125	19	Mechanism and architecture for manufacturing control	700/29	700/108; 700/96;	
9	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5592599 A	19970107	62	Video special effects system with graphical operator	345/427	345/649; 345/722	
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5548705 A	19960820	21	Wiping metaphor as a user interface for operating on	345/863	345/642	
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5487172 A	19960123	508	Transform processor system having reduced processing	712/32	700/8	

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	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Re
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5914721 A	19990622	38	Visibility calculations for 3D computer graphics	345/421	345/422	
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5742295 A	19980421	57	Video special effects system with graphical operator	345/427	345/650	
12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5710700 A	19980120	19	Optimizing functional operation in manufacturing	700/29	700/108	
13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5691895 A	19971125	19	Mechanism and architecture for manufacturing control	700/29	700/108; 700/96;	
14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5687737 A	19971118	29	Computerized three-dimensional cardiac	600/523	600/509	
15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5592599 A	19970107	62	Video special effects system with graphical operator	345/427	345/649; 345/722	
16	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5572125 A	19961105	44	Correction and automated analysis of spectral and	324/307	324/309	
17	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5548705 A	19960820	21	Wiping metaphor as a user interface for operating on	345/863	345/642	
18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5519618 A	19960521	76	Airport surface safety logic	701/120	701/301	
19	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5487172 A	19960123	508	Transform processor system having reduced processing	712/32	700/8	
20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5374932 A	19941220	78	Airport surface surveillance system	342/36	342/29; 342/39;	
21	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5198977 A	19930330	47	System and method for localization of functional	382/128	356/40; 382/162;	

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	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6230048 B1	20010508	26	Pictorial-display electrocardiographic	600/523		
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6172679 B1	20010109	39	Visibility calculations for 3D computer graphics	345/421	345/422	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6157621 A	20001205	143	Satellite communication system	370/310	370/394; 370/400;	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6137570 A	20001024	24	System and method for analyzing topological	356/237.5	250/559.04; 356/237.2	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6132724 A	20001017	210	Allelic polygene diagnosis of reward deficiency	424/725	514/188; 514/561	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6077680 A	20000620	91	ShK toxin compositions and methods of use	435/7.24	424/185.1; 514/12;	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5986673 A	19991116	19	Method for relational ordering and displaying	345/649	345/440; 345/660	
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5914721 A	19990622	38	Visibility calculations for 3D computer graphics	345/421	345/422	
11	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5742295 A	19980421	57	Video special effects system with graphical operator	345/427	345/650	
12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5710700 A	19980120	19	Optimizing functional operation in manufacturing	700/29	700/108	
13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5601005 A	19971125	10	Method for	700/20	700/100	

File Details HTML

DEPR:

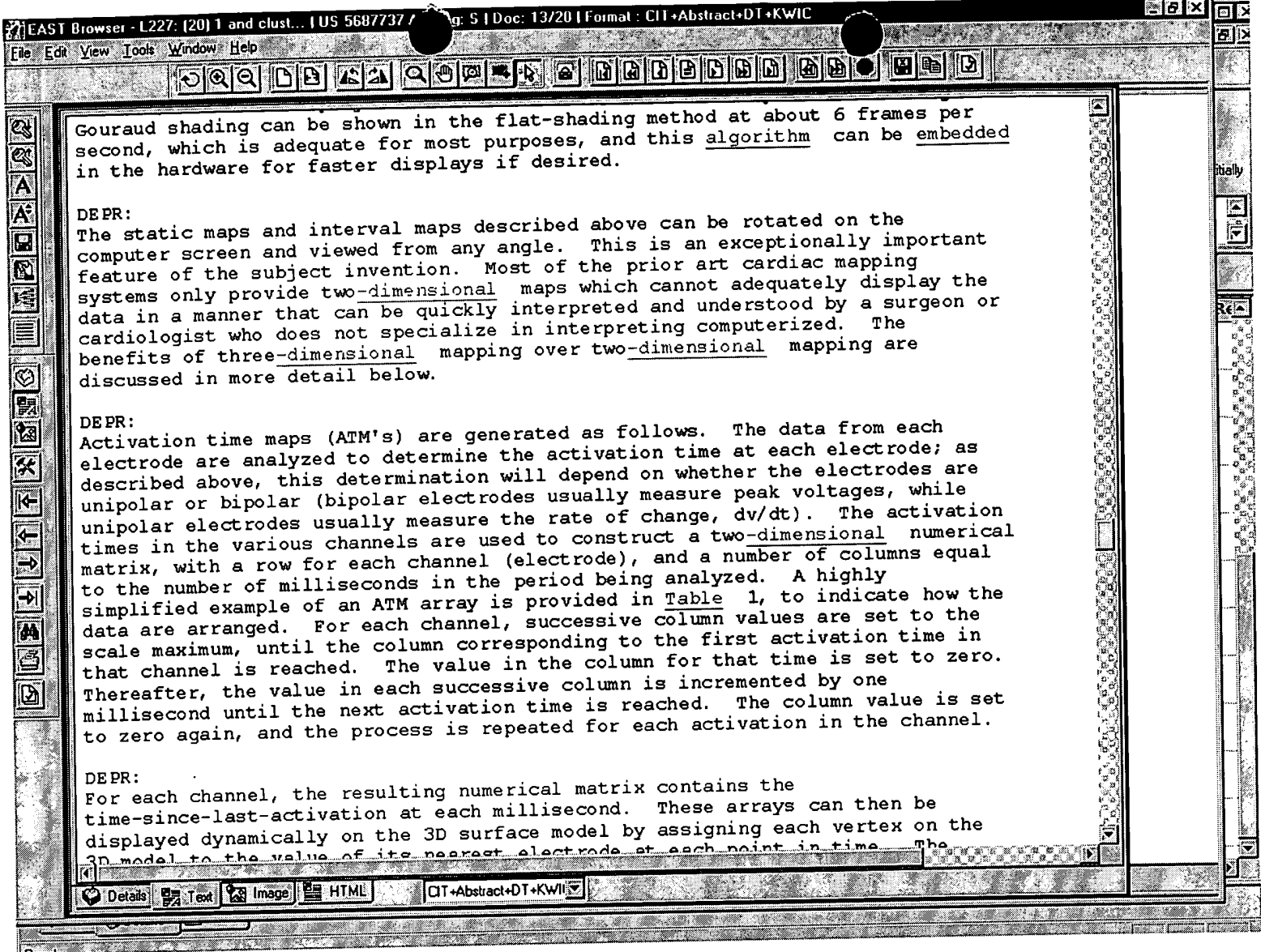
The steps to generate a single 3D surface contour map display are the same regardless of whether the display is for a static or interval map (described below), or for one frame of a dynamic (moving) display. There are differences, however, depending on whether a flat-shaded map with distinct contour boundaries or a gouraud-shaded map with gradually changing contour colors (discussed below) is produced.

DEPR:

For activation time maps, a step can be used to detect sharp discontinuities between early and late times, to avoid displaying all possible contours at such discontinuities. It may help to visualize this by thinking of there being an abrupt cliff where elevation changes sharply from a high altitude to a low one. In a topological map it may be appropriate to draw many closely spaced contour lines to represent the elevation change. For an activation time map, however, where an activation wave front contour exists, there are no intermediate times (contours) between that contour edge and the repolarized, high -time value color area it is advancing over. Thus, no intermediate contours should be drawn between the triangle vertex for an area just activated and the other vertices of that triangle which are not yet activated. This discontinuity problem is only present for activation time static maps or time-since-last activation dynamic maps; for potential distribution maps, which are analogous to topological maps, discontinuities do not exist.

DEPR:

(2) Gouraud-shaded maps. If Gouraud shading is used (Gouraud 1971), the color hues can vary across a single planar facet if the numerical values at the vertex points around the periphery of the facets fall into different color assignment ranges. Gouraud shading effectively interpolates the values across the surface of a facet and displays a smooth continuum of colors accordingly. Due to this type of shading across a single facet, there are no abrupt color discontinuities. The Silicon Graphics GTX workstation is able to perform Gouraud shading calculations using algorithms embedded in integrated circuits, without requiring additional software to be read or used, and the processing is very rapid; a Gouraud shaded surface model having thousands of facets can be



Gouraud shading can be shown in the flat-shading method at about 6 frames per second, which is adequate for most purposes, and this algorithm can be embedded in the hardware for faster displays if desired.

DEPR:

The static maps and interval maps described above can be rotated on the computer screen and viewed from any angle. This is an exceptionally important feature of the subject invention. Most of the prior art cardiac mapping systems only provide two-dimensional maps which cannot adequately display the data in a manner that can be quickly interpreted and understood by a surgeon or cardiologist who does not specialize in interpreting computerized. The benefits of three-dimensional mapping over two-dimensional mapping are discussed in more detail below.

DEPR:

Activation time maps (ATM's) are generated as follows. The data from each electrode are analyzed to determine the activation time at each electrode; as described above, this determination will depend on whether the electrodes are unipolar or bipolar (bipolar electrodes usually measure peak voltages, while unipolar electrodes usually measure the rate of change, dv/dt). The activation times in the various channels are used to construct a two-dimensional numerical matrix, with a row for each channel (electrode), and a number of columns equal to the number of milliseconds in the period being analyzed. A highly simplified example of an ATM array is provided in Table 1, to indicate how the data are arranged. For each channel, successive column values are set to the scale maximum, until the column corresponding to the first activation time in that channel is reached. The value in the column for that time is set to zero. Thereafter, the value in each successive column is incremented by one millisecond until the next activation time is reached. The column value is set to zero again, and the process is repeated for each activation in the channel.

DEPR:

For each channel, the resulting numerical matrix contains the time-since-last-activation at each millisecond. These arrays can then be displayed dynamically on the 3D surface model by assigning each vertex on the 3D model to the value of its nearest electrode at each point in time. The

DEPR:

The software created by the Applicants provides a number of control options which provide immediate user -interactive control over the viewing orientation and over the data which is displayed on the monitor screen. These levels of control greatly enhance the usefulness of the invention in helping surgeons and cardiologists rapidly and clearly interpret the data. In particular, it allows surgeons and cardiologists to study the progress of a depolarization wave around an entire cardiac surface, even though the surfaces (atrial endocardial surfaces in particular) have complex and irregular shapes. The invention accomplishes this goal by allowing the image to be rotated in real-time (i.e., the image rotates in a smooth and continuous manner, without jumping discontinuously to different images, and without being limited to a limited number of previously prepared views), and by allowing the display of a wavefront to be started, stopped, frozen, and reversed at any moment in time, until the progress of a wave across each surface of interest, at each relevant moment in time, has been displayed and studied to the satisfaction of the surgeon or cardiologist.

DEPR:

The subject invention provides these capabilities in a manner which is easy for an operator to carry out. For example, the user can rotate the surfaces in any of the three mapping modes, in real time, by a simple procedure using a standard two- or three-button computer mouse. The pointer arrow or other cursor icon on the monitor screen is moved to any location in the viewing window on the monitor screen, and the left button on the mouse is depressed. This causes rotation of the image about an imaginary axis which passes through the center of the image, perpendicular to the location of the pointer icon. For example, if the pointer icon is placed on either side of the cardiac surface image and the mouse button is held down, the image will rotate about an imaginary vertical axis; if the pointer icon is placed directly below the cardiac surface image and the mouse button is held down, the image will rotate about an imaginary horizontal axis. In each situation, the previously hidden perspective which is close to the location of the pointer arrow will become visible as that portion of the surface rotates to the center of the image.

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Re
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6230048 B1	20010508	26	Pictorial-display electrocardiographic	600/523		
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6172679 B1	20010109	39	Visibility calculations for 3D computer graphics	345/421	345/422	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6031548 A	20000229	22	Progressive multi-level transmission and display of	345/440		
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6028608 A	20000222	66	System and method of perception-based image	345/619		
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6008820 A	19991228	71	Processor for controlling the display of rendered	345/502		
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5914721 A	19990622	38	Visibility calculations for 3D computer graphics	345/421	345/422	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5867166 A	19990202	86	Method and system for generating images using	345/419	345/473; 345/629;	
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5865832 A	19990202	22	System for detecting, measuring and compensating	606/10	351/209; 606/13;	
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5742295 A	19980421	57	Video special effects system with graphical operator	345/427	345/650	
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5735283 A	19980407	17	Surgical keratometer system for measuring surface	600/558	351/211; 351/212	
11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5687737 A	19971118	29	Computerized three-dimensional cardiac	600/523	600/509	
12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5592599 A	19970107	62	Video special effects system with graphical operator	345/427	345/649; 345/722	
13	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5519618 A	19960521	76	Airport surface safety logic	701/120	701/301	
14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5374932 A	19941220	78	Airport surface surveillance system	342/36	342/29; 342/39;	

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	Ret
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6298174 B1	20011002	10	Three-dimensional display of document set	382/305	358/403; 707/1	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6278799 B1	20010821	44	Hierarchical data matrix pattern recognition system	382/159	382/155; 382/156;	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6134541 A	20001017	30	Searching multidimensional indexes using associated	707/2	707/1; 707/3	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6122628 A	20000919	34	Multidimensional data clustering and dimension	707/5	707/2; 707/3	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6035057 A	20000307	43	Hierarchical data matrix pattern recognition and	382/159	382/155; 382/156	
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	US 5794178 A	19980811	45	Visualization of information using graphical	704/9	345/440; 345/839;	
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5675819 A	19971007	29	Document information retrieval using global word	704/10	704/9; 707/3;	
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2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6292761 B1	20010918		Methods and apparatus for interpreting measured	702/189	345/440; 702/67;	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6185561 B1	20010206		Method and apparatus for providing and expression	707/6	435/6	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6020898 A	20000201		Information display system for displaying time-series	345/440		
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5546516 A	19960813		System and method for visually querying a data set	345/440	345/418; 345/419	
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 4920498 A	19900424		Method of processing and analyzing electrophoretic	204/546	345/440; 345/660;	

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1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6301579 B1	20011009	46	Method, system, and computer program product for	707/102	345/440; 707/104.1
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6185561 B1	20010206	48	Method and apparatus for providing and expression	707/6	435/6
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6074831 A	20000613	15	Partitioning of polymorphic DNAs	435/6	345/440; 435/91.1;
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5841959 A	19981124	288	Robotic interface	345/440	
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	U	I	Document ID	Issue Date	Pages	Title	Current OR	Current XRef	R
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6301579 B1	20011009	46	Method, system, and computer program product for	707/102	345/440; 707/104.1	
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6292761 B1	20010918	14	Methods and apparatus for interpreting measured	702/189	345/440; 702/67;	
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6185561 B1	20010206	48	Method and apparatus for providing and expression	707/6	435/6	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6074831 A	20000613	15	Partitioning of polymorphic DNAs	435/6	345/440; 435/91.1;	
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6020898 A	20000201	26	Information display system for displaying time-series	345/440		
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5841959 A	19981124	288	Robotic interface	345/440		
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5841958 A	19981124	15	Bipartite matching	345/440		
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5546516 A	19960813	16	System and method for visually querying a data set	345/440	345/418; 345/419	
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 4920498 A	19900424	29	Method of processing and analyzing electrophoretic	204/546	345/440; 345/660;	

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	U		Document ID	Issue Date	Pages	Title	Current OR	Current XRef
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 6330008 B1	20011211	64	Apparatuses and methods for monitoring performance of	345/772	345/766; 345/771;
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5847717 A	19981208	25	Data synchronization between a plurality of asynchronous	345/506	345/559; 345/582
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 5790130 A	19980804	76	Texel cache interrupt daemon for virtual memory	345/587	
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 4945500 A	19900731	32	Triangle processor for 3-D graphics display system	345/422	345/506; 345/519;
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	US 4885703 A	19891205	29	3-D graphics display system using triangle processor	345/422	345/419; 345/620

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Microsoft

A preferred algorithm for such a system is a clustering algorithm for, e.g., identifying functionally related genes with different time curves. In particular, the clustering algorithm may be used for clustering genes whose functional correlation involves a scale change, a time delay, a vertical flip or any combination of the three. The system

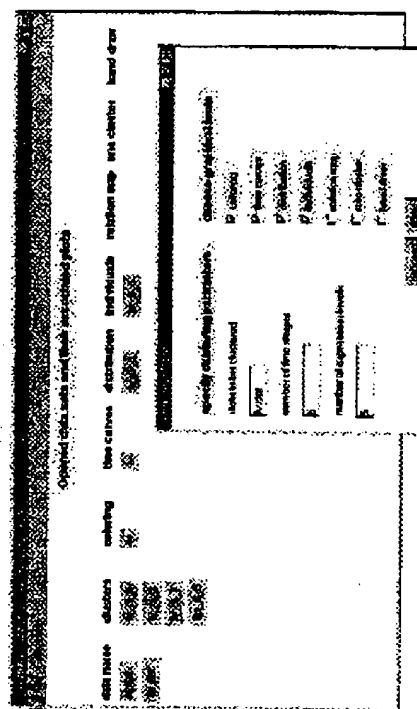


Figure 20

Def. 64+65



Brief Summary Text - BSTX (5):

A preferred algorithm for such a system is a clustering algorithm for, e.g., identifying functionally related genes with different time curves. In particular, the clustering algorithm may be used for clustering genes whose functional correlation involves a scale change, a time delay, a vertical flip or any combination of the three. The system preferably also includes a time-curve representation that is both literal and numerical. Literal representations assist in making SQL (Standard Query Language) type database queries. Numerical representations assist in allowing for the arithmetical transformation of curves. Such transformations are useful in differentiating tissue and disease specificity of gene expression. In addition, clustering algorithms and mathematical calculations preferably are tightly integrated with a graphical user presentation interface. Finally, graphics preferably are included to assist in navigation and analysis of the expression data in an intuitive, interactive, and iterative fashion.

Brief Summary Text - BSTX (6):

Indeed, there is a need for improved computer-aided techniques for the analysis and manipulation of gene expression data. The

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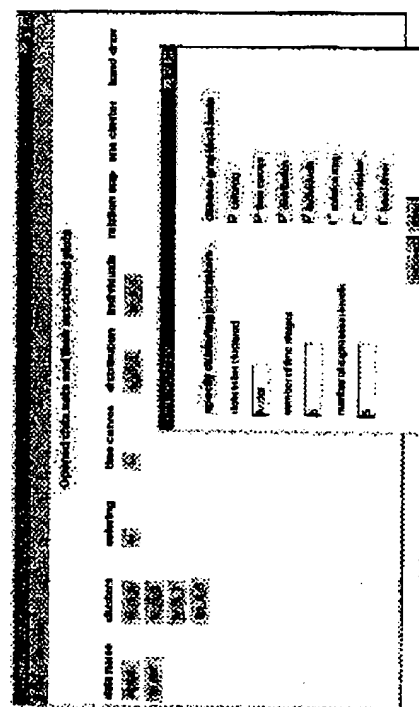


Figure 20



Brief Summary Text - BSTX (8):

The present invention relates to systems for manipulating and analyzing gene expression data. In one embodiment, the system comprises a means for receiving gene expression data for a plurality of genes; a means for comparing the gene expression data from each of said plurality of genes to a common reference frame; a means for assigning a grid representation to each of said gene expression data from said plurality of genes; and a means for presenting said assigned grid representation. More specifically, this system further comprises means for clustering said grid representations. Still further, the grid representation may be normalized to within [-1,1]. The gene expression data for each of said plurality of genes comprises a plurality of expression levels and a plurality of associated time points.

Brief Summary Text - BSTX (9):

Clustering preferably may be grid clustering or .sigma.-.tau. clustering. The presentation step of the methods and systems of the invention preferably comprises one or more of the following for each grid representation or cluster thereof: temporal pattern of expression; file designation; gene identification number; major class; sub class; gene

Index, table, file
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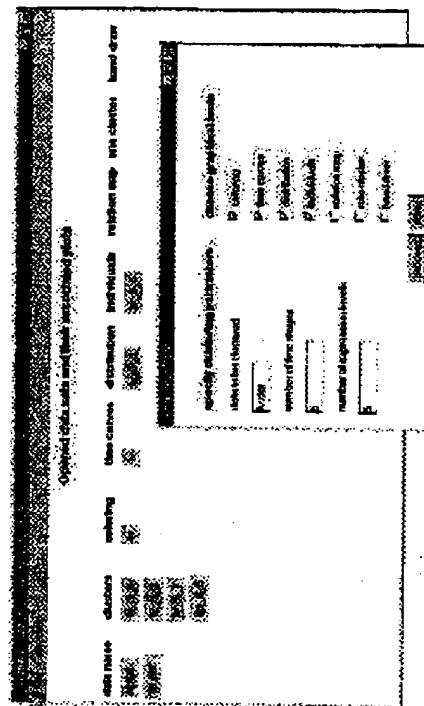


Figure 20

Clustering preferably may be grid clustering or σ - τ clustering. The presentation step of the methods and systems of the invention preferably comprises one or more of the following for each grid representation or cluster thereof: temporal pattern of expression; file designation; gene identification number; major class; sub class; gene description; grid representation; and time curve. This data may then be hyperlinked within said display. Further, clustered grid representations may be compared, for example, based on tissue origin or gene. The clusters themselves may be created based on, for example, gene or tissue origin.

Another embodiment of the present invention relates to a method, in a computer system, of manipulating expression data associated with a gene, comprising the steps of: inputting expression data for a plurality of genes; comparing the expression data from said plurality of genes to a common reference frame; and assigning a grid representation to said expression data based on said comparing step. Based on its assigned grid representation, the expression data may be clustered and presented by relative

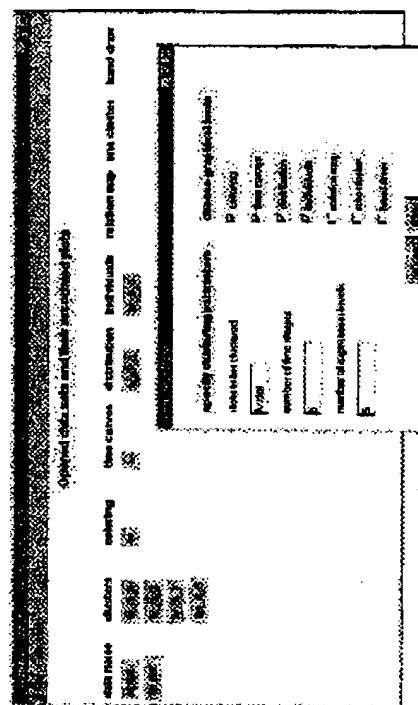


Figure 20

① Selection process of Index/File

(2) Analyzing etc. —
hyperlinked.



Brief Summary Text - BSTX (10):

Another embodiment of the present invention relates to a method, in a computer system, of manipulating expression data associated with a gene, comprising the steps of: inputting expression data for a plurality of genes; comparing the expression data from said plurality of genes to a common reference frame; and assigning a grid representation to said expression data based on said comparing step. Based on its assigned grid representation, the expression data may be clustered and presented by relative expression levels. The clustering may also be presented by time stage, or by both relative expression level and time stage. The grid representation preferably comprises a relative expression level component and a time stage component. The relative expression level may preferably comprise three, five, seven, nine, eleven, thirteen, or fifteen relative expression levels. The time stage may preferably comprise two, three, four, five, six, seven, eight, nine, ten, eleven, twelve, thirteen, fourteen, or fifteen time stages. Clustered expression data may be sorted by relative expression level, time stage, or by both relative expression level and time stage.

Brief Summary Text - BSTX (11):

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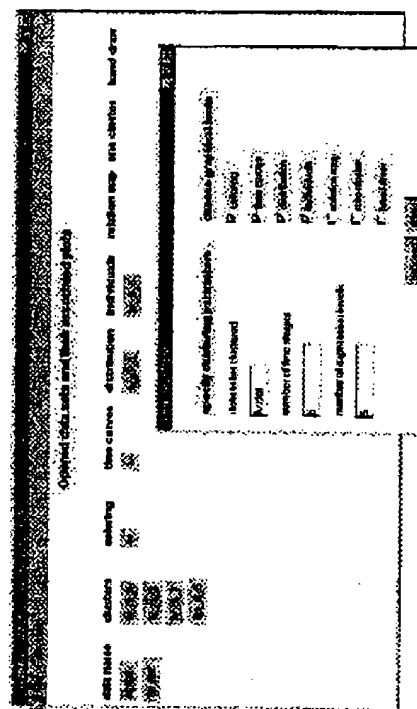


Figure 20



FIG. 5 is a flowchart of a preferred embodiment of the systems of the present invention that shows the clustering of processed GED through Grid Clustering.

Drawing Description Text - DRTX (7):

FIG. 6 is a flowchart of another preferred embodiment of the systems of the present invention that shows the clustering of processed GED through .sigma.--tau. Clustering.

Drawing Description Text - DRTX (12):

FIG. 11 presents a screen display of the distribution of clustered genes on a grid with 5 time stages and 5 expression levels, where the geometric shape of the cluster is quantitatively described by the cluster name.

Drawing Description Text - DRTX (13):

FIG. 12 presents a screen display of a representative GUI wherein a user scrolls through individual clusters to examine the accuracy of clustering or to search for particularly shaped time curves.

Drawing Description Text - DRTX (14):

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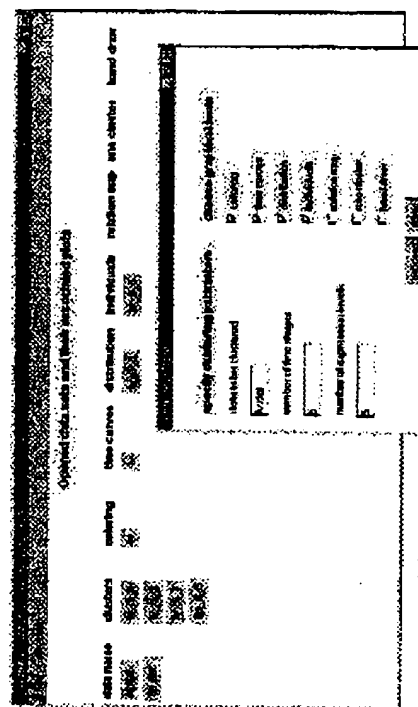


Figure 20

FIG. 13 presents a screen display of a representative clustering for a 5-3 grid and clustering for a 5-7 grid.

FIG. 15 presents a screen display of a representative GUI for viewing .sigma.-tau. clustering, as well as time curves for the selected gene.

FIG. 18 presents a screen display of a representative GUI that allows side by side comparison of clustering profiles for two genes.

FIG. 20 presents a screen display of a representative main system window, containing tools for tracking input data and associated clustered data sets. The displayed pop-up window provides a GUI wherein the user can select clustering parameters and graphical tools.

The present invention relates to a system for ~~analyzing gene expression data~~

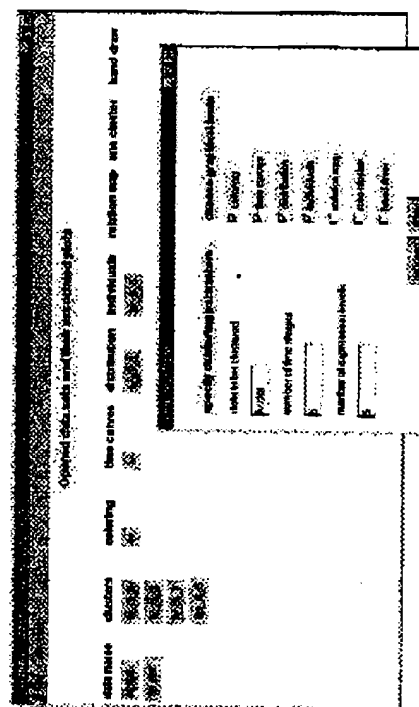


Figure 20



Detailed Description Text - DETX (52):

In this representation, the window contains scrollable panels for the text properties associated with each gene. Such properties preferably include the presentation of clone ID, major class, subclass and description. One can selectively color and mark one or any number of genes by highlighting the genes in a panel, which preferably are specified from the property selection list at the top of the window. For each gene, the color and mark symbol also may be specified from the color and symbol selection lists at the top of the window. Each highlighted time curve also may be dehighlighted by selecting the corresponding highlighted gene in the specified property scrollable panel. Indeed, any of these properties displayed on the browser may be hyperlinked.

Detailed Description Text - DETX (53):

In a preferred embodiment, a click on the black reset button at the upper right corner serves to remove all highlights. Since the panels can be independently scrolled, a gene index column may be provided for each panel for tracking their relative positioning.

Detailed Description Text - DETX (54):

U.S. Patent

Jul. 17, 2001

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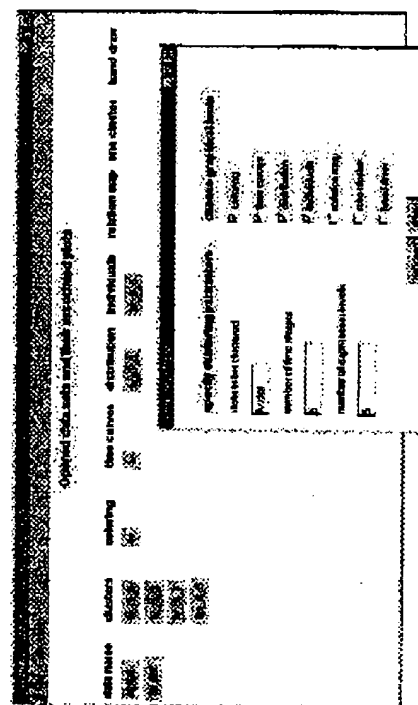


Figure 20



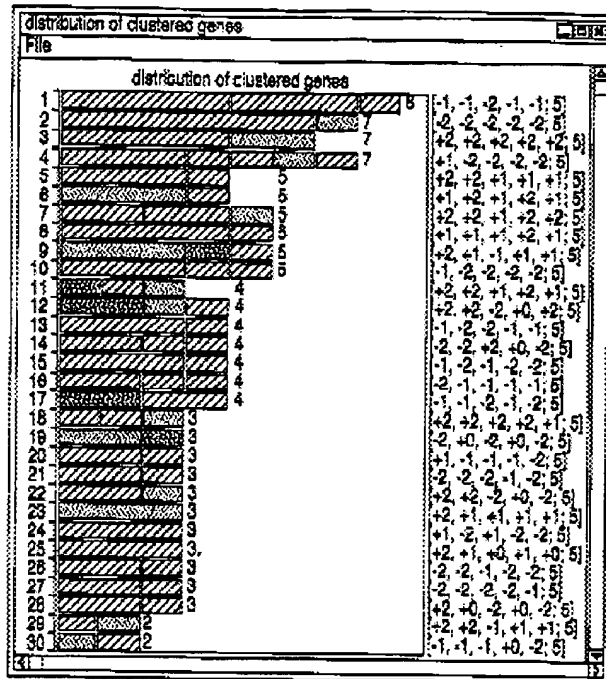
Detailed Description Text - DETX (54):

F. Presenting Distributions of Clustered Genes

Detailed Description Text - DETX (55):

A representative distribution of clustered genes on a grid with 5 time stages and 5 expression levels is presented in FIG. 11. FIG. 11 presents a screen display of the distribution of clustered genes on a grid with 5 time stages and 5 expression levels, where the geometric shape of the cluster is quantitatively described by the cluster name. Again, for each gene, the color and mark symbol also may be specified from the color and symbol selection lists at the top of the window. Each highlighted time curve also may be dehighlighted by double clicking the corresponding highlighted gene in the specified property scrollable panel. Indeed, any of these properties displayed on the browser may be hyperlinked. There are 201 clusters (only the top 30 are shown), each represented by a bar. The length of a bar preferably may be proportional to the size of the cluster, which is labeled at the end of the bar. In a preferred embodiment, some of the bars consist of several colored bands, each representing a major class of genes as provided in FIG. 9. The length of each color band preferably may also be proportional

FIG. 11





Detailed Description Text - DETX (64):

Another aspect of the systems of the present invention preferably provides an interactive graphical tool for presenting .sigma.-.tau. clustering. Referring to FIG. 15, in a preferred embodiment there are text fields at the top of the window. Specifically, FIG. 15 presents a screen display of a representative GUI for viewing .sigma.-.tau. clustering, as well as time curves for the selected gene. The first three fields depicted allow one to specify a set of expression data for clustering, the maximum amplitude of the time shift and the expression level. The last field allows one to search for genes whose description property contains a specific key word. By clicking on the search for keyword button, one can re-arrange all the key word containing genes to the top of the description panel. To perform .sigma.-.tau. clustering, one chooses a reference time curve, to which other time curves are compared, by highlighting a row in the scrollable description panel.

Detailed Description Text - DETX (65):

In a representative example of the systems of the present invention, when the rat brain natriuretic peptide gene (No. 52) is highlighted, 13 color squares of 26 genes are displayed on the .sigma.-.tau.

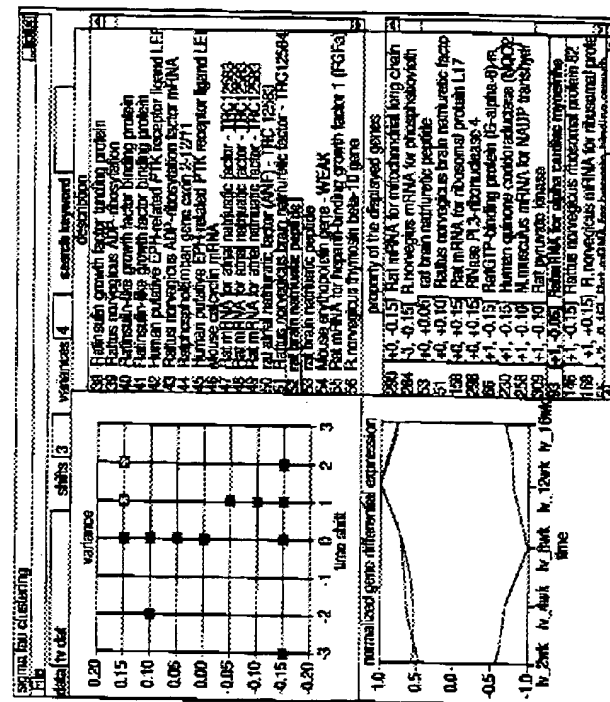


FIG. 15

Detailed Description Text - DETX (65):

In a representative example of the systems of the present invention, when the rat brain natriuretic peptide gene (No. 52) is highlighted, 13 color squares of 26 genes are displayed on the .sigma.-.tau. plot with a shift range of 3 and variance range of 4. The squares may be colored according to their major classes, with the square at the (0, 0) grid point corresponding to the highlighted gene itself. The (.tau., .sigma.) coordinates and description of the genes displayed in the .sigma.-.tau. plot preferably are listed in the displayed genes panel. In a preferred embodiment, by highlighting a row in the displayed genes panel, one can view the time curves in the normalized differential gene expression panel: the time curve highlighted in the description panel (e.g., pink), the time curve highlighted in the normalized differential gene expression panel (e.g., gray) and its transform (e.g., blue). FIG. 15 presents a representative .sigma.-.tau. plot after changing the shift and variance text fields. Specifically, the transform curve in FIG. 15 represents the normalized curve after a time shift and a vertical flip. The near perfect overlap of the time and transformed curves suggests a potential time-shifted negative correlation between rat brain natriuretic peptide (No. 52) and alpha cardiac myosin heavy chain (No.

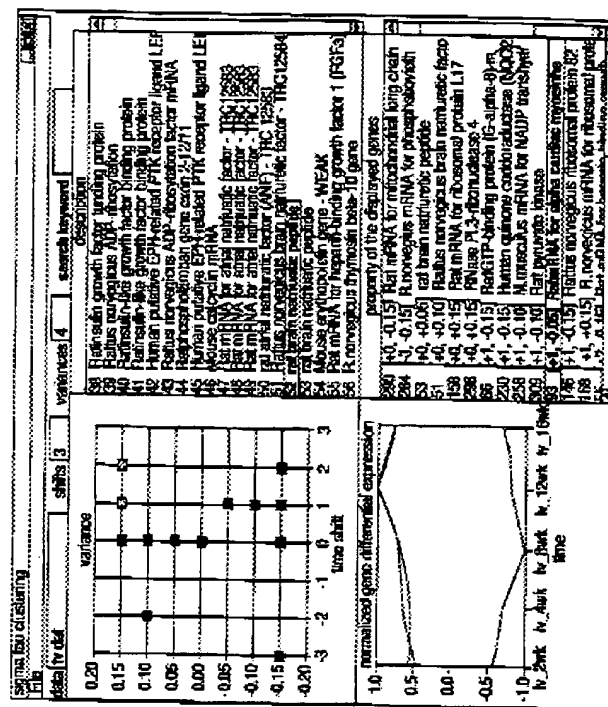


FIG. 15

graphical tools. In this particular format, there are a number of scrollable panels. For each gene, the first panel preferably displays the cluster name in the left ventricle, the septum and the difference between two clusters, whereas the remaining panels preferably display the text properties of the genes. A gene index column preferably is included in the panel to assist tracking of specific genes when the lists are independently scrolled.

Detailed Description Text - DETX (75):

Due to the inherent round-off error of any grid clustering, two time curves of a similar shape sometimes fall into different clusters. In such cases, it may be preferable to view the actual difference between the curves to check the accuracy or inaccuracy of clustering. This can be accomplished in this presentation format by highlighting a gene in the first panel. A pop-up window will subsequently display the two time curves: the left ventricle and septum. Multiple highlightings are preferably provided (two are shown in FIG. 19). De-highlighting the corresponding genes in the first panel can close the pop-up windows.

Detailed Description Text - DETX (77):

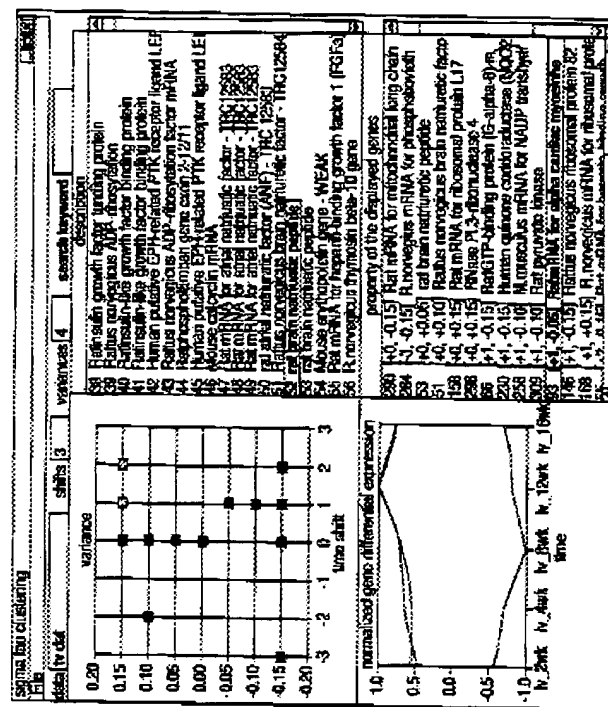


FIG. 15



A graphical user interface provides a scalable information structure. Interactive categories are displayed as expansive locations on a display as part of a desktop. In a first preferred embodiment of the invention, each category in a tier of an information structure occupies a dedicated expansive location in a list displayed within a defined region on the display. A location occupied by a selected category is expanded or compressed to display the next tier in the information hierarchy as a list, or as a cluster. Remaining locations are resized to accommodate newly-displayed contents within the defined region. The list is directly scrolled by selecting and moving locations with a pointing device. In a second, equally preferred embodiment of the invention, expansive locations are displayed as a cluster arrangement. A selected cluster is highlighted and expanded to display the next tier in the information hierarchy as a list, or as a cluster. Any previously-selected cluster is deselected and contracted. An expansive location may include a text descriptor, a text command, or a pictorial icon. Hypertext Markup Language (HTML), Email, or cached WWW page links may also be embedded within a list.

(22) United States Patent
Lokige

(23) Patent No. US 6,452,957 B1
(24) Date of Patent Jun. 26, 2001

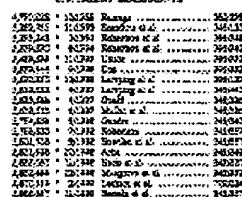
(34) SCALABLE USER INTERFACE FOR GRAPHICALLY REPRESENTING HIERARCHICAL DATA

(37) Inventor: Michael Lokige, Menlo Park, CA (US)

(70) Assignee: Netscape Communications Corporation, Menlo Park, CA (US)

(51) Int. Cl. G06F 03/00, G06F 15/00, G06F 17/00, G06F 19/00, G06F 21/00, G06F 23/00, G06F 25/00, G06F 27/00, G06F 29/00, G06F 31/00, G06F 33/00, G06F 35/00, G06F 37/00, G06F 39/00, G06F 41/00, G06F 43/00, G06F 45/00, G06F 47/00, G06F 49/00, G06F 51/00, G06F 53/00, G06F 55/00, G06F 57/00, G06F 59/00, G06F 61/00, G06F 63/00, G06F 65/00, G06F 67/00, G06F 69/00, G06F 71/00, G06F 73/00, G06F 75/00, G06F 77/00, G06F 79/00, G06F 81/00, G06F 83/00, G06F 85/00, G06F 87/00, G06F 89/00, G06F 91/00, G06F 93/00, G06F 95/00, G06F 97/00, G06F 99/00, G06F 101/00, G06F 103/00, G06F 105/00, G06F 107/00, G06F 109/00, G06F 111/00, G06F 113/00, G06F 115/00, G06F 117/00, G06F 119/00, G06F 121/00, G06F 123/00, G06F 125/00, G06F 127/00, G06F 129/00, G06F 131/00, G06F 133/00, G06F 135/00, G06F 137/00, G06F 139/00, G06F 141/00, G06F 143/00, G06F 145/00, G06F 147/00, G06F 149/00, G06F 151/00, G06F 153/00, G06F 155/00, G06F 157/00, G06F 159/00, G06F 161/00, G06F 163/00, G06F 165/00, G06F 167/00, G06F 169/00, G06F 171/00, G06F 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FIG. 4 is a front view of a computer display showing a first tier of a graphical user interface having a scalable file structure according to a first preferred embodiment of the invention;

[illegible]

28 Claims, 16 Drawing Figures



(2) The invention provides a graphical user interface (GUI) having a scalable display for showing information, commands, and/or file structures substantially in their entirety. In the invention, interactive categories within lists or clusters are displayed as expansive locations on a computer display of a computer system. Such locations are expanded or compressed upon respective selection or deselection to permit the user to view subcategory information, as well as higher level information. The list may be directly scrolled by selecting a category with a pointing device and by dragging the list to the desired location, for example using drag and drop techniques.

(3) The exemplary embodiment of the invention is considered to be only one of several different display formats in which the invention may be implemented. Thus, the invention can be readily implemented by one skilled in the art in any desired display format, such as Java, html, and C++. The actual generation of the GUI display can be performed using well-known hardware and software techniques.

(4) FIGS. 4 through 8 sequentially show the operation of a first preferred embodiment of the invention. FIG. 4 provides

(22) United States Patent
Lohmeyer

(US) Patent No.: US 6,232,497 B1
(US) Date of Patent: Jun. 26, 2001

(34) SCALABLE USER INTERFACE FOR GRAPHICALLY REPRESENTING HIERARCHICAL DATA

OTHER PUBLICATIONS

(2) Inventor: Barbara L. Long, Myrtle Beach, SC
(3)

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(73) Analysis: Netpage Corporation
Cambridge, MA 02139

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(*) Note: Subject to any limitation, the term of the patent is extended to a period under 1 U.S.C. 281(b) by 3 years.

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[25] *Appl. Sci.*: [2020](#), **10**, 2022.

(See continued on next page.)

(22) Date Feb. 14, 1957

Primary Director—Mark A. Perrell
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(2) ΔG° maximum: 697.402 Gcal/1000

(2) U.S. DEPARTMENT OF JUSTICE 1034 1037

(12) Field of Impact \$46,353, 167

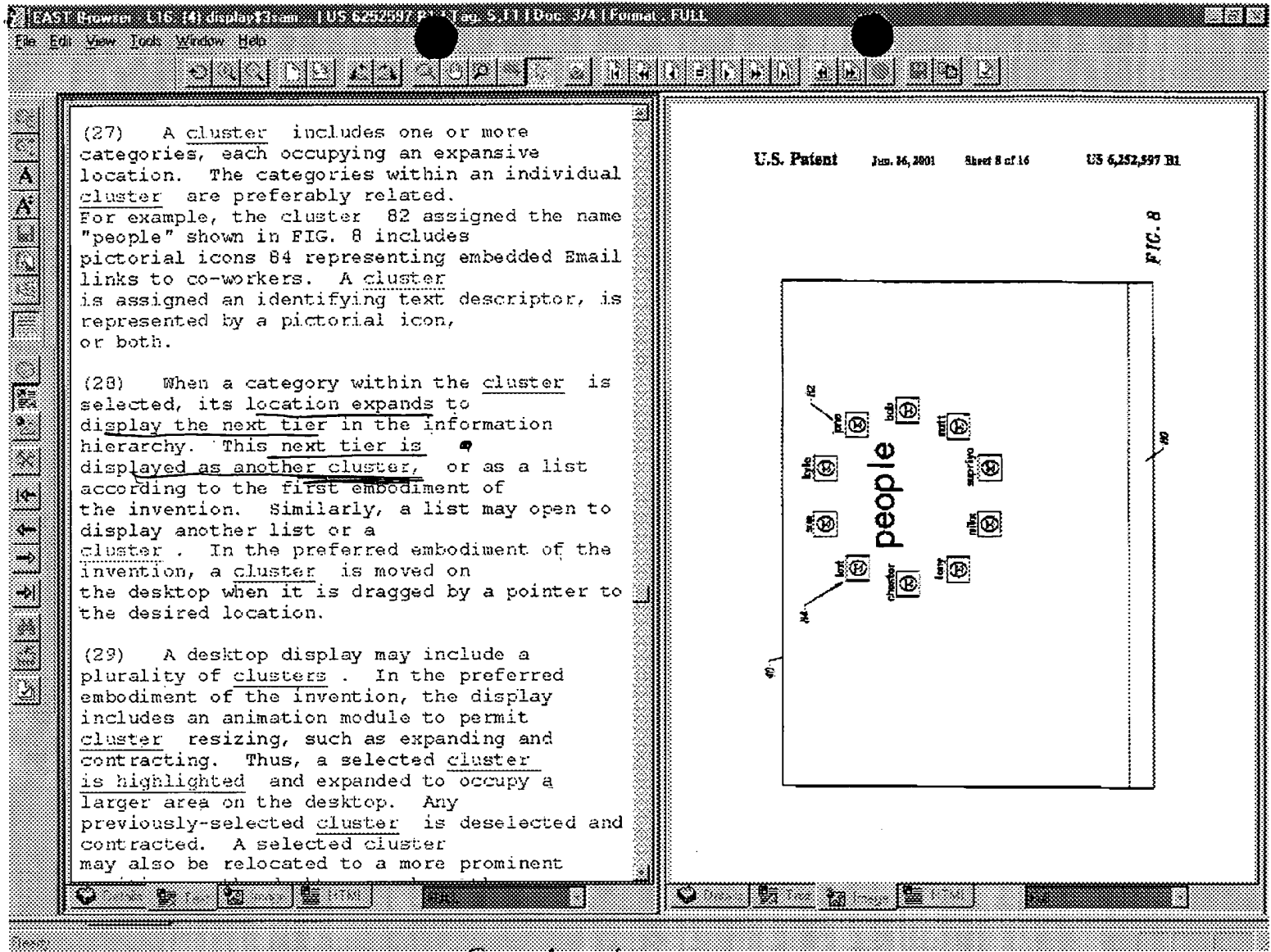
(40) **Reference:** Chel

2.1.4. PLANTING AND POST-PLANTING

[illegible][illegible]

28 Claims, 16 Drawing Sheets





• another expanded clustering



(29) A desktop display may include a plurality of clusters. In the preferred embodiment of the invention, the display includes an animation module to permit cluster resizing, such as expanding and contracting. Thus, a selected cluster is highlighted and expanded to occupy a larger area on the desktop. Any previously-selected cluster is deselected and contracted. A selected cluster may also be relocated to a more prominent position on the desktop, such as the center of the desktop; while unselected clusters may be relocated to less prominent positions on the desktop, e.g. the periphery of the desktop.

(30) In alternate embodiments of the invention, a selected cluster is highlighted only, expanded only, or is indicated by other means, such as sound or animation. However, the invention may be adapted to permit a plurality of clusters to be selected and expanded at the same time.

(31) While the clusters shown in FIG. 8 are circular, one skilled in the art will readily appreciate that a cluster may take any desired shape. In one embodiment of the invention, the cluster shape is user defined. The user selects the shape, dimensions, or contents of the cluster as desired. In another embodiment of the invention, the shape of the cluster is pre-defined by the system software. Similarly, the

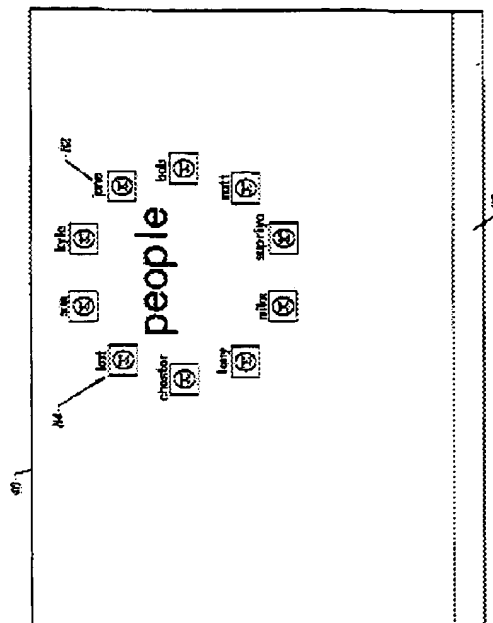
U.S. Patent

Jun. 26, 2001

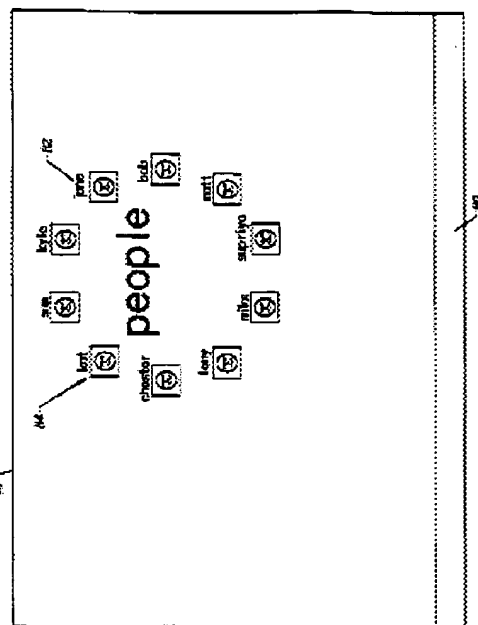
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FIG. 8



(33) Hyperlinks may be embedded in the preview. A user may thereby directly connect to a particular [www](#) page. This embodiment is advantageous as it permits the user to connect a desired link quickly without first having to connect to the Internet and load the [www](#) page.



21

wherein the term linear means in a vertical or horizontal direction on said display, and expansion and compression is performed hyperbolically.

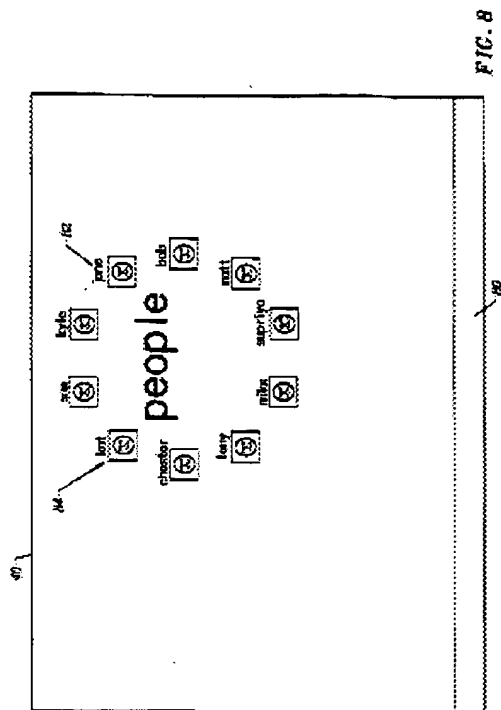
at least a second expansive location,
wherein said second expansive location
is compressed in response to the selection of
said first expansive location.

19. The structure of claim 16, wherein said scalable information structure comprises a cluster .

29. The structure of claim 19, wherein animation is used to contract a second cluster display and enlarge said first cluster display upon highlighting or selection of said first cluster .

21. The structure of claim 20, wherein said first cluster is moved to a central portion of said display screen upon selection.

22. The structure of claim 16, wherein a pointing device is used within said defined region to directly select said





3. The apparatus of claim 1, wherein said scalable information structure comprises a list.

4. The apparatus of claim 1, wherein said scalable information structure comprises at least a first cluster.

5. The apparatus of claim 4, further comprising:

at least a second cluster, wherein, upon highlighting or selection of said first cluster, said second cluster display is contracted and said first cluster is enlarged.

6. The apparatus of claim 4, further comprising:

at least a second cluster, wherein, upon highlighting or selection of said first cluster, said first cluster is moved to a central portion of said display screen.

7. The apparatus of claim 1, wherein a pointing device is used to select said expansive location at a first location within said defined region, and to drag said expansive device to a second location.

8. The apparatus of claim 3, wherein the contents of said expansive location comprise a cluster.

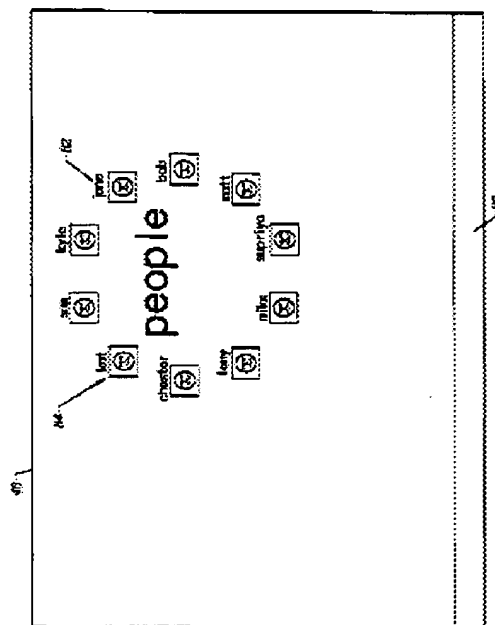
U.S. Patent

Jan. 26, 2001

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FIG. 8



File View Edit Tools Windows Help

USPAT. US 6561136 EPO. JPO. DERWENT. IBM. IDB

Default operator: OR

Display: 3 and cluster\$3 and hot adj spot\$1
Same highlight\$3 and interactive\$2

Failed
Saved

	U	1	Document ID	Issue Date	Pages	Title	Current OR	Current XRe	Re
1			US 6561136	20020503	54	System for converting existing TV content to an interactive media content for interactive	725/113		
2			US 6436961 B1	20031217	19	System for converting media content for interactive	725/112	345/4131	
3			US 5870769 A	19990203	47	Expert system and method employing hierarchical knowledge	715/801.1	345/7311	
4			US 5872745 A	19981013	37	Expert system and method employing hierarchical knowledge	706/50	706/461	
5			US 5906056 A	19980903	47	Expert system and method employing hierarchical knowledge	706/50	706/461	
6			US 5720067 A	19980217	30	Expert system and method employing hierarchical knowledge	706/50	706/461	
7			US 5636394 A	19971203	43	Expert system and method employing hierarchical knowledge	706/50	706/461	
8			US 5644066 A	19970701	39	Expert system and method employing hierarchical knowledge	706/45	706/461	

Hit Details HTML

NUM

#2 - 15, 31, 51 (sections) clustering for an object in motion
 (not claimed)
 segmentation & clustering techniques
 segments

#3 - 164 hotpotting a link a word etc. -

6243287 Detx 64 + Detx 65